



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/837,210	04/19/2001	Masanori Ogura	35.C15304	6939

5514 7590 06/25/2002

FITZPATRICK CELLA HARPER & SCINTO
30 ROCKEFELLER PLAZA
NEW YORK, NY 10112

EXAMINER

BAUMEISTER, BRADLEY W

ART UNIT PAPER NUMBER

2815

DATE MAILED: 06/25/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.
09/837,210

Applicant(s)
Ogura et al.

Examiner
B. William Baumeister

Art Unit
2815



-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on Nov 2, 2001
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-40 is/are pending in the application.
- 4a) Of the above, claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-40 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on Apr 19, 2001 is/are a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
*See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s). 5 6) ☐ Other:

Art Unit: 2815

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Drawings

2. Figure 11 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

3. The drawings are objected to because the specification recites (page 17, line 5) that Fig 5 depicts an embodiment wherein the well-contact between the adjacent picture cell arrays are displaced from the position in Embodiment 1 (FIG 2A) with the other constitution kept unchanged. However, FIG 2A shows two vertical lines separating R array 2 and G1 array 4, while FIG 5 depicts a single horizontal line separating R array 2 and G2 array 3. As such, in contradistinction to the specification's assertion, the rest of the drawings' constitutions are not unchanged.

- a. Further, it is unclear what these respective two vertical lines of FIG 2A and single horizontal line of FIG 5 are intended to depict. The array lead arrows (e.g., 2-5 in FIG 2A) point

Art Unit: 2815

to the bounded array that is interior to the unlabeled surrounding squares, so it is unclear if they are supposed to form the boundary of the respective arrays 2-5. Moreover, while the space between the unlabeled squares and the conductor 11 may be presumed to be the interior portion of the doped region 13, this renders the drawings further unclear as to what the unlabeled region between the unlabeled square surrounding array 2 and the unlabeled square surrounding array 4 is intended to depict. The same issue is raised by the unlabeled region between G2 array 3 and B array 5.

- b. Appropriate correction is required.
- c. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Objections

4. Claim 29 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 29 sets forth a third color picture cell array. However, independent claim 21--from which claim 29 depends--already sets forth a third color picture cell array. As such, claim 29 fails to further limit claim 21.

Art Unit: 2815

Claim Rejections - 35 U.S.C. § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1-4, 7, 10-12, 16, 19, 35 and 37 are rejected under 35 U.S.C. 102(b) as being anticipated by Hoeberechts '899.

a. Hoeberechts discloses photodiode (PD) arrays that may be employed for detecting visible electromagnetic radiation (col. 1, line 20). Note particularly FIGs 5-7 wherein a PD array is comprised of a 2-dimensional array of PD elements 20. A plurality of such arrays are disposed on a common n-well 2. Each array is surrounded by p-doped region 23 ("an element isolation region") and associated contact via 27 and contact metallization 28. The contact metallizations are to be kept as small as possible in order to obtain the largest possible effective detection area (col. 1, lines 55-65). This implies that the metallizations are not transparent to light (i.e., constitutes a light intercepting member). Bond pad 26 connects each of the arrays' regions 23 to an external common voltage.

Claim Rejections - 35 U.S.C. § 103

Art Unit: 2815

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hoeberechts '899 as applied to claim 11 above. Hoeberechts does not appear to further disclose the specific material employed for the metallization wiring 27. Nonetheless it would have been obvious to one of ordinary skill in the art at the time of the invention to have employed Al or Cu because these are the most commonly employed metallization materials for semiconductor devices and because they have high conductivities, are abundant and inexpensive, and have physical properties which were well understood by those in the art.

9. Claims 1-12, 16-22, 26-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP '264 in view of Hoeberechts '899 as applied to the claims above.

a. JP '264 (previously made of record in IDS #5 and discussed in the background section of the present application) teaches a solid state imaging device wherein a plurality of PD-array cells are integrated on a common substrate and a specific one of R, G and B light is respectively directed to each one of the arrays by means of focusing lenses and common filters (e.g. FIG 2 and Applicant's Background section explaining the reference). Further, the PD cells

Art Unit: 2815

possess IGFET transistors and CCD structures in addition to the PD (e.g., FIGs 1 and 3). It is unclear from the English Abstract of the foreign reference whether the PD arrays are formed on a common well.

b. Hoeberechts discloses plural PD arrays that may be employed for detecting visible electromagnetic radiation (col. 1, line 20). Note particularly FIGs 5-7 wherein a PD array is comprised of a 2-dimensional array of PD elements 20. A plurality of such arrays are disposed on a common n-well 2. Each array is surrounded by p-doped region 23 (“an element isolation region”) and associated contact via 27 and contact metallization 28. The contact metallizations are to be kept as small as possible in order to obtain the largest possible effective detection area (col. 1, lines 55-65). This implies that the metallizations are not transparent to light (i.e., constitute a light intercepting member). Bond pad 26 connects each of the arrays’ regions 23 to an external common voltage.

c. It would have been obvious to one of ordinary skill in the art at the time of the invention to have employed the PD cell array layout as taught by Hoeberechts in the image device of JP ‘264 for the purpose reducing the required surface area for the PD arrays, thereby leading to greater miniaturization and reduced capacitance as taught by Hoeberechts.

d. Regarding claim 21 and the claims depending therefrom, each of JP ‘264 and Hoeberechts depict a single row of plural arrays and it is unclear whether JP ‘264 further discloses that the arrays may be formed in a 2D array of arrays (i.e., wherein the first and fourth (second and third) arrays are positioned diagonally). Nonetheless, it would have been obvious to one of

Art Unit: 2815

ordinary skill in the art at the time of the invention to have employed a 2D array of arrays for the purpose of detecting light from a larger source.

e. Regarding claims 31 and 33, Hoeberechts teaches that the substrate wiring 27 may be provided with a single contact pad 26 with the wiring surrounding all of the arrays (i.e., not formed between arrays) or alternatively may be formed independently for each array with a separate bond pad for each wiring 27 for increased reliability (col. 4, lines 45-). Further, it would have been readily understood by one of ordinary skill in the art at the time of the invention that providing independent wiring for each of the arrays would (in addition to increasing redundancy/reliability) increase space requirements and block area that could be potentially used for photodetection/circuitry functions; and provide a more uniform voltage across the substrate by contacting a greater portion thereof; whereas providing a single wiring around multiple arrays would have the opposite effect. As such, it would have been obvious to one of ordinary skill in the art at the time of the invention to have either formed separate substrate wirings for each array or alternatively to have provided a single wiring for some combination or all of the arrays depending only upon which of the countervailing benefits/detriments are more desired for the particular application.

f. Regarding claim 34, regardless of whether either of these references teaches PD array groups wherein diagonal groups detect green and R/B, respectively, it was well known to those of ordinary skill in the art at the time of the invention to provide individual regions of PD arrays in this manner for the purpose of evenly detecting the different colors over a wide area.

Art Unit: 2815

10. Claims 1-12, 16-22, 26-40 are alternatively rejected under 35 U.S.C. 103(a) as being unpatentable over JP '264-- Hoeberechts '899 as applied to the claims above and further in view of Eom et al. '323.

a. The embodiment depicted in FIGs 5-7 of Hoeberechts is explained as being specifically employed for X-ray detection. Thus, while Hoeberechts specifically recites that the invention may be employed for detecting visible light, assuming *arguendo* that the reference must be read so narrowly as not specifically teaching that R,G,B light may be detected by PD arrays provided in a common well, the claims would nonetheless be obvious in view of Eom et al. '323.

b. Eom teaches PD arrays wherein R,G,B PD pixels are provided in a common well and separated by FOX isolating regions. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to have employed the teachings of Eom in relation to detecting visible light in the layout of Hoeberechts since Hoeberechts teaches that the invention may be employed for detecting visible light and Eom provides means of doing this more efficiently.

11. Claims 13-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hoeberechts as applied to claims 11 and 12 above, and further in view of JP '459. Hoeberechts teaches that the wiring intercepts light but does not specifically recite the materials of which it is composed. JP '459 teaches photodetectors having metallizations composed of Ti or TiN over Al for the

Art Unit: 2815

purpose of preventing light reflection and smearing. It would have been obvious to use this combination of materials for this reason as taught by the JP '459.

12. Claims 23-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP '264--Hoeberechts or alternatively JP '264--Hoeberechts--Eom as applied to claims 21 and 22 above, and further in view of JP '459. Hoeberechts teaches that the wiring intercepts light but does not specifically recite the materials of which it is composed. JP '459 teaches photodetectors having metallizations composed of Ti or TiN over Al for the purpose of preventing light reflection and smearing. It would have been obvious to use this combination of materials for this reason as taught by the JP '459.

Conclusion

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- a. Marcovici '153 teaches photoelectric conversion devices having a plurality of arrays 20-28 formed on a common well 38 on substrate 40; each of the arrays may be further sub-divided for creating a 2D array (col. 5).
- b. Botka et al. '611 teaches photoelectric conversion device arrays formed on a common well on substrate 62

Art Unit: 2815

- c. Arbus et al. '247 teaches an array of PDs and circuits formed on a common substrate.
- d. Yu '032 teaches a multi-color CCD-PD array having cells formed on a common well 32.
- e. WO '042 teaches a plurality of 2x2 PD arrays formed on a common well 48 (see FIGs 7 and 8).
- f. Orava et al. '013 teaches a plurality of photoelectric arrays formed on a common substrate.
- g. Needs et al. '756 provides evidence that it was well known to provide PD arrays with filters so as to be sensitive to R,G,B light respectively in the pattern set forth in claim 34.

INFORMATION ON HOW TO CONTACT THE USPTO

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to the examiner, **B. William Baumeister**, at (703) 306-9165. The examiner can normally be reached Monday through Friday, 8:30 a.m. to 5:00 p.m. If the Examiner is not available, the Examiner's supervisor, Mr. Eddie Lee, can be reached at (703) 308-1690. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0956.



B. William Baumeister
Patent Examiner, Art Unit 2815
June 23, 2002